Cardboard floor: About the barriers for social progression and their impact on the representativeness of epidemiological studies.

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Abstract (111 words)

The most disadvantaged extreme of the social continuum is usually underrepresented in epidemiological studies. We discuss the consequences of excluding this segment of the population and suggest different approaches for addressing this issue. In particular, we describe/analyse a barrier that tends to perpetuates people in the most disadvantaged extreme of the social continuum, hereinafter referred to as the "cardboard floor". Besides, we propose different approaches to accessing to the least favoured, segment in order to study the cardboard floor. The adoption of these strategies could help to visualize this barrier, allowing to better monitoring social mobility and their expected health improvements, as well as increasing the representativity of population health studies.

A continuum of socioeconomic status ranging from the least to the most privileged persons is evidenced in population studies, with profound implications for health and care [1]. Individuals in the most disadvantaged social group suffer from extreme poverty and face several specific challenges to their health and health care [2]. They frequently cannot meet their most basic needs (including their physiological needs, most acutely exemplified by homelessness) and are at a higher risk of health problems and accelerated aging due to unhealthy habits (e.g. unhealthy diet and drug consumption), harmful environmental and biological factors, and social isolation [1–4]. As a result, the most socially disadvantaged persons have higher rates of premature mortality, especially caused by suicide and violence, and higher prevalence of all types of diseases, particularly infectious diseases and mental disorders [2,5]. Besides, care for chronic conditions is compromised for this population group, which relies to a substantial degree on emergency care, particularly in health systems that do not guarantee universal health coverage [5].

Even considering the relative size of the most deprived extreme of the social continuum (e.g. about 0.5% of the U.K. adult population in 2018 was considered homeless) [6], the scale of unmet health and health care needs would imply that improving their social mobility might have a significant impact on the overall health status of the population. However, several barriers significantly hinder this upward mobility. If a glass ceiling is used as a metaphor for the barrier to higher achievement, success, or recognition for individuals of certain groups within different careers or industries (e.g. women becoming CEOs), an even more appropriate one in this case would be a *cardboard floor*, making reference to the surface that is a daily experience for many extremely deprived people [7]. Studying the impact of this barrier on health, could help to understand it better, hopefully favouring social mobility. Conducting such studies, however, is not exempt from

difficulties, one which being particularly relevant: the lack of access to data from persons in the least favoured extreme of the social continuum.

The most disadvantaged group is very unlikely to be included in research and, as a result, is usually inadequately represented in health studies. This recruitment bias has important implications [3,4,8]. It limits the representativeness and external validity of surveys and population health studies and, furthermore, results in underestimation of the health risks, morbidity and mortality across the entire population. Importantly, it also hides the true scope of the specific issues affecting this group from researchers, policy makers and the public.

Different approaches focusing on improved sampling strategies to guarantee the representation of this group in population studies could be used. [3,8,9]. Proposed complementary strategies include: assigning greater sampling weights to individuals in this group, targeted over-recruitment, and/or intensifying fieldwork in marginal areas or suburbs through involvement of social organisations at local level. Nevertheless, these methods require some a priori knowledge of the number of people in this situation when defining the reference population for a specific study.

The use of data from administrative data and Electronic Health Records (EHR), such as the Medicaid claims data in the U.S. and the Clinical Practice Research Datalink (CPRD) in the U.K. [9,10], could also be a suitable way to access to the most socially disadvantaged persons. Relevant health and healthcare information for this population are often registered within these data sources. Some limitation of this data needs to be acknowledged in relation to their completeness, and ability to capture circumstances of maximum vulnerability and the inclusion of information on key mediating mechanisms relevant to determine biological, behavioural, and psychosocial pathways. However, such data also have strengths: they are in many cases mandatory, population-wide and usually

contain relevant information on different health outcomes, such as mortality or hospital admissions. Besides, most such data are potentially linkable to other relevant datasets for the study of this population (e.g. social care or demographic records) bringing together their strengths and, in some cases, allowing to overcome the abovementioned limitations [9,11]. Hence, the use of linked data from EHR could be a suitable way to capture relevant aspects of the most socially vulnerable individuals and, furthermore, might represent an adequate approach to obtain valid and reliable estimations of the health status in this part of the population. In addition linked EHR data, would allow estimating the relative numbers of the most disadvantaged group, providing relevant additional information on morbidity and outcomes and facilitating the implementation of improved sampling strategies [9].

The access to the most disadvantaged extreme segment of the social continuum remains a challenge for population health studies. Using a combination of approaches based on the use of HER linked data and strengthening the sampling strategy for the specific studies, might be a synergistic way to improve the validity of population health estimations. The adoption of these strategies could help to visualize the barriers for social mobility and the access to the most disadvantaged social groups. This will help to better understand the phenomena that perpetuate the cardboard floor and to shape care systems that truly "do not leave one behind" [12].

Contributorship Statement

All authors (JA-T, JMV, FGV and JA) were involved in all phases of the development of this manuscript, from the initial idea to the review and acceptance of the final draft for submission.

Competing interests

None declared.

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